

Internet of Things in Smart Home Appliances

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Abstract

Abstract— The large-scale implementation of IoT devices promises to transform many aspects of the way we live. For consumers, new IoT products like Internet-enabled appliances, home automation components, and energy management devices are moving us toward a vision of the “smart home”, offering more security and energy effectiveness. Other personal IoT devices like wearable robustness and health monitoring devices and network-enabled medical devices are transforming the way healthcare services are delivered. This technology promises to be favourable for people with disabilities and the elderly, enabling enhanced levels of independence and quality of life at a reasonable cost.

Keywords: Smart Home, Sensor, Remote, Automotive.

I. Introduction

The Internet of Things (IoT) is the ability to have devices communicate with one another via the internet or other networks, remotely tracking information to provide feedback to assist with decision making for commercial, industrial and residential purposes. This is commonly done using sensors connecting to a back-to-base system.

Some common day-to-day examples could be:

Temperatures in refrigeration or food heating units in the food and beverage industry. Assistance with the control of temperature and humidity levels. Detection of gas and dust levels. Monitoring of water levels and herd locations for agricultural purposes.

Different applications in the automotive, aviation and nautical sectors such as the sensing of tyre pressures for trucking fleets.

A smart home system can be something that makes our life quite easy. Starting from energy management where the power controls system in the AC appliances where we use the thermostat, all this is managed to cut down the power consumption that's taking place. A door management system, security management system, water management system are the part of this as well. Still, these are vital things that stand out in the smart home system. The limitation of IoT in smart home application stops where our imagination stops. Anything that we wish to automate or want to make our life easier can be a part of smart home, a smart phone system as well. Smart Home is a safe, networked and intelligent home control system integrated with automation control, network communication and Internet of things (IoT).

The IoT based Smart Home, by application of sensors, collects indoor environmental parameter information such as temperature, humidity and gas concentration, etc., as well as information on various household appliances. The information collected will then be transmitted by the IoT gateway to the server on the Internet and users can monitor the operation of each subsystem of the Smart Home after login. In this paper, a systematic framework of IoT based Smart Home has been designed, studies on home safety precaution, smart lighting, environmental control and home appliance control have been conducted and the system functions have also been tested.

II. Functions of Smart Home Appliances

A smart home system consists of applications built on top of IoT infrastructure. The smart home applications can have following main functions –

A. Attentive

The smart home system is able to sense its environment and accordingly send alerts to the user on registered device or account. The alert consists of information related to environmental data. This information may include level of different gases in the atmosphere, warmth, damp, daylight, passion etc. Alert may be sent to user on regular basis at predefined time. Alert may be sent over email, as a text message, through tweets or through any other societal medium.

B. Examine

This is the most important function of smart home. A smart home is capable of monitoring its surrounding with the help of various sensors and camera feed. Examine is an important function as it keeps track to every activity in a smart home which is the primary need on basis of which any further action can be taken or decision can be made. For example monitoring room temperature and sending alert to user to switch on air-conditioner if temperature is above entrance.

C. Distant access

When most people talk about smart homes, what they really mean is remote access to one's home systems. Distant access lets you operate your home's systems without cloning yourself.

D. Sophisticated home network

It refers to the wirelessly controlled network of devices that is becoming a bigger part of our lives and is central to the smart home. To maintain a highly functional Internet of Things, the automated home

needs something a bit more robust than a wireless router tucked out of sight to maintain an unbroken blanket of Wi-Fi. It needs enterprise-class networking equipment, as well as several wireless access points placed strategically throughout the home.

E. Lighting control, automated window treatments

Together, lighting control and automated window treatments allow you to control every aspect of your home lighting and diminish unsightly wall clutter such as excessive switches. Lighting control systems are typically network-based, so a whole building can be controlled from one spot.

F. Scattered audio

Scattered audio makes that dream a reality, connecting multiple (or all, for the ambitious) rooms to your home network, putting the power to DJ your home right at your fingertips — and yes, it can integrate seamlessly with the other components of your smart home. With lighting and music under your full control, you can turn your living space into a complete club experience without flipping a switch.

III. Applications of Smart Home

We all are experiencing new things every single day as time passes. Of all, most come with the invention of the computer and the arrival of the internet. The more we rely on them the easier things get. However, as we all know, new things bring new challenges.

In a way of starting a new era, Internet of Things as a term has hopped into our lives and started to dominate the field pretty well. In every facet of life, we can come across with the smart home IoT applications.



Fig: 1 Smart Home Applications

G. Elegant Lighting

Elegant lighting is used for energy saving which can be achieved by adapting lighting to the ambient conditions and by switching on/off or dimming of lights according to user needs thus reducing the unnecessary use of energy. Saving energy also helps in reducing cost. The smart lighting can be implemented with Solid State lighting (LEDs) or IP enabled lights (Internet or wireless controlled). The smart lighting works by sensing the occupancy, temperature/humidity and LUX level in the environment.

H. Stylish Appliances

Stylish appliances are used for gathering status information of appliances and to easily control appliances from within the room or remotely. It is also used for forecast tasks at predefined time and for runtime integration between appliances. Smart appliances save energy and time.

I. Intrusion Detection

Intrusion detection is used for alerting user through email and text message. The intrusion detection application can also send detailed report with images or audio/video clip to the user.

The main goal of this application is to monitor suspected activity in smart home and alert user and take necessary actions for security purpose.

Smoke/Gas Detection This application is used for sensing the smart home environment for healthy living and can also be used for security.

This application is used for optical detection, ionization, and air sampling practice. It is capable of raising alert to near by fire station in case of fire and smoke and to user via email/SMS informing them about health risks.

Merits of Smart Home

1. Managing all of your home devices from one place. The expediency factor here is enormous. Being able to keep all of the technology in your home connected through one interface is a massive step forward for technology and home management. Theoretically, all you'll have to do is learn how to use one app on your smart phone and tablet, and you'll be able to tap into countless functions and devices throughout your home. This cuts way back on the learning curve for new users, makes it easier to access the functionality you truly want for your home.
2. Flexibility for new devices and appliances. Smart home systems tend to be wonderfully flexible when it comes to the accommodation of new devices and appliances and other technology. No matter how state-of-the-art your appliances seem today, there will be newer, more impressive models developed as time goes on. Beyond that, you'll probably add to your suite of devices as you replace the older ones or discover new technology to accompany your indoor and outdoor spaces. Being able to integrate these newcomers seamlessly will make your job as a homeowner much easier, and allow you to keep upgrading to the latest lifestyle technology.

3. Maximizing home security. When you incorporate security and surveillance features in your smart home network, your home security can skyrocket. There are tons of options here -- only a few dozen of which are currently being explored. For example, home automation systems can connect motion detectors, surveillance cameras, automated door locks, and other tangible security measures throughout your home so you can activate them from one mobile device before heading to bed. You can also choose to receive security alerts on your various devices depending on the time of day an alert goes off, and monitor activities in real-time whether you're in the house or halfway around the globe.

4. Remote control of home functions. Don't underestimate the power of being able to control your home's functions from a distance. On an exceptionally hot day, you can order your house to become cooler in just enough time before you get home from work. If you're in a hurry to get dinner started but you're still at the store, you can have your oven start to preheat while you're still on your way home. You can even check to see if you left the lights on, who is at your front door, or make sure you turned off all your media while you're away.

5. Increased energy efficiency depending on how you use your smart-home technology, it's possible to make your space more energy-efficient. For example, you can have more precise control over the heating and cooling of your home with a programmable smart thermostat that learns your schedule and temperature preferences, and then suggests the best energy efficient settings throughout the day. Lights and motorized shades can be programmed to switch to an evening mode as the sun sets, or lights can turn on and off automatically when you enter or leave the room, so you never have to worry about wasting energy.

6. Improved appliance functionality. Smart homes can also help you run your appliances better. A smart TV will help you find better apps and channels to locate your favorite programming. A smart oven will assist you with cooking your chicken to perfection -- without ever worrying about overcooking or undercooking it. An intelligently designed home theater and audio system can make managing your movie and music collection effortless when entertaining guests. Ultimately, connecting your appliances and other systems with automation technology will improve your appliance effectiveness and overall make your home life much easier and enjoyable!

7. Home management insights. There's also something to be said for your ability to tap into insights on how your home operates. You can monitor how often you watch TV (and what you watch), what kind of meals you cook in your oven, the type of foods you keep in your refrigerator, and your energy consumption habits over time. From these insights, you may be able to analyze your daily habits and behaviors, and make adjustments to live the lifestyle you desire.

Demerits of Smart Home

1. Privacy: One problem regarding smart homes is voice activation. In order for it to work, voice activation has to be on and listening all the time. Some news outlets suggest that some companies listen to smart assistant devices and can overhear what is said in your home.

2. Bandwidth: The more things that you have hooked to your wifi, the more bandwidth you are going to take up. Since your smart house uses that wifi to do its job, you run the risk of slowing down everything on your system if you don't have enough bandwidth. You can

sign up for more bandwidth through your Internet service provider.

3. Internet Security: One big problem with the IoT is that hackers can use all those machines and devices to host attacks and viruses on the rest of the Internet. Luckily, you can relatively easily overcome this by making sure that you change default passwords and use strong passwords. Strong passwords are generally long, with numbers, letters, and special characters.

4. Power Surges: Another disadvantage is that power surges can cause problems with the entire automation system, so you will have to make sure that you protect everything from surges.

CONCLUSION AND FUTURE WORK

A. Conclusion

The home automation using Internet of Things has been experimentally proven to work adequately by connecting simple appliances to it and the appliances were productively controlled remotely through internet. The designed system not only monitors the sensor data, like temperature, gas, light, motion sensors, but also acts process according to the obligation, for example switching on the light when it gets dark. It also stores the sensor parameters in the cloud (Gmail) in a timely manner. This will help the user to scrutinize the situation of various parameters in the home anytime anywhere.

Future work

Using this system as frame work, the system can be stretched to include various other options which could include home security feature like capturing the photo of a person stirring around the house and storing it onto the cloud. This will reduce the data storage than using the CCTV camera which will record all the time and stores it. The system can be extended for energy monitoring, or weather stations. This kind of a system with individual changes can be implemented in the hospitals for immobilize people or in industries where human invasion is impossible or risky, and it can also be implemented for ecological monitoring.

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